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None

(58) Field of search
B5N
Selected US specifications from IPC sub-class B32B

(54) Absorbent laminate

(57) An absorbent laminate for use in wound dressings, incontinence aids and the like comprises an apertured plastics film and a fibrous layer which contains thermal bonding fibres. The two layers are bonded by embossing in a pattern such that the fibrous layer is compressed in the vicinity of at least some of the apertures. Such compressed regions form a path to wick fluid away from the apertures into non-embossed areas.

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

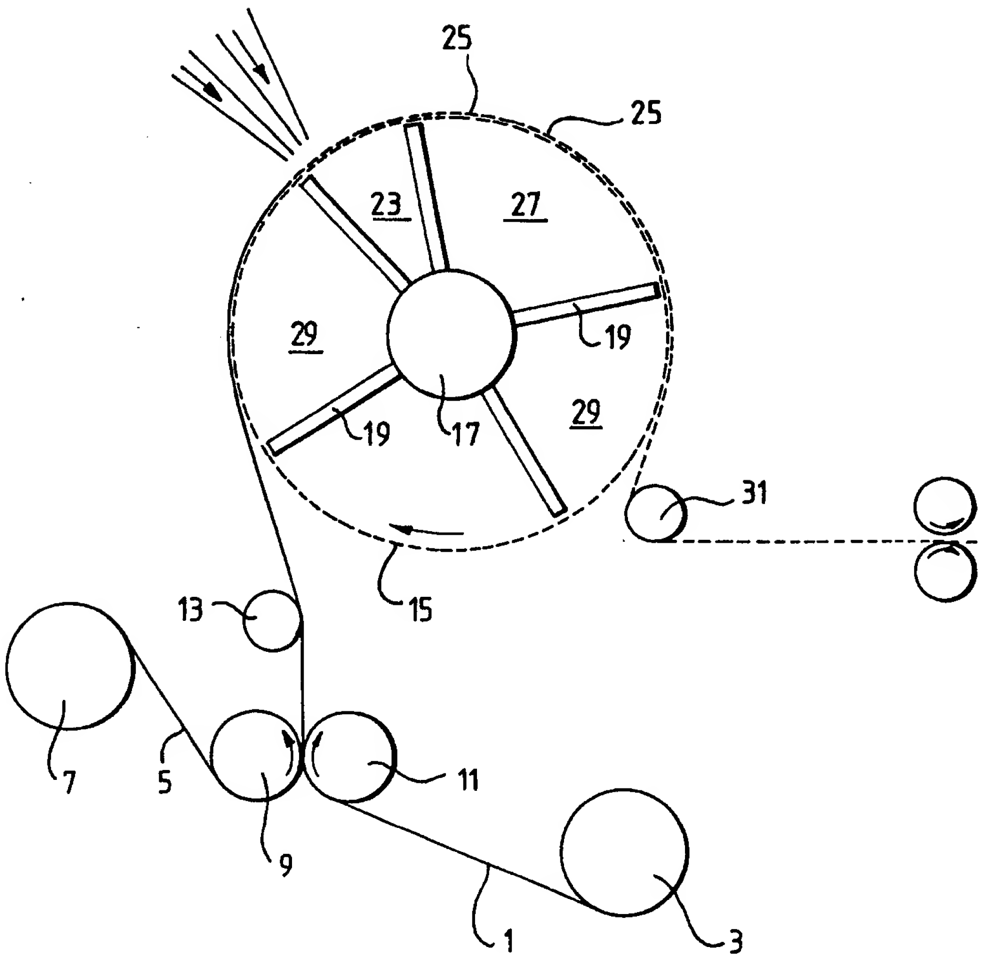


Fig.1.

Fig.2A.

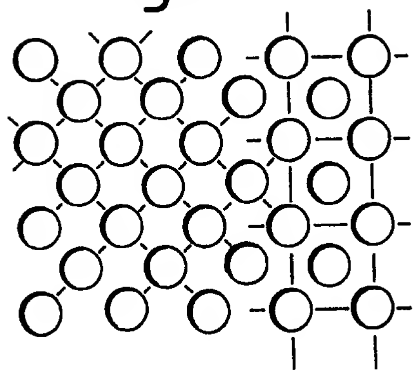


Fig.2B.

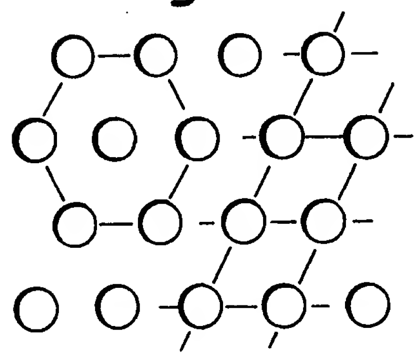


Fig.2C.

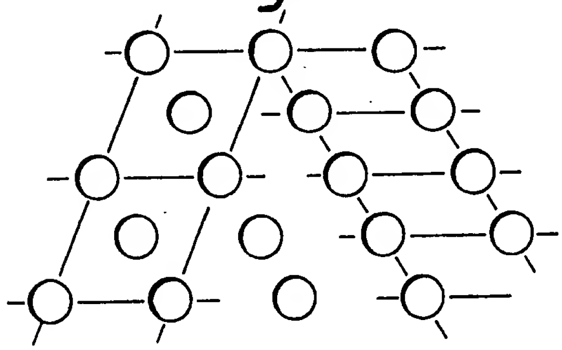


Fig.2D.

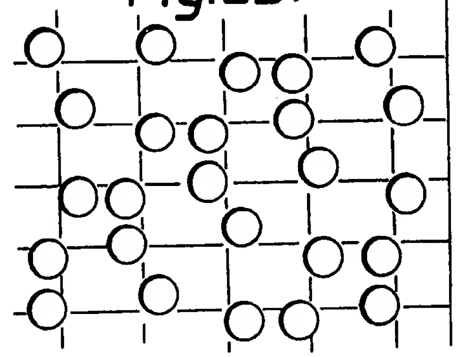


Fig.2E.

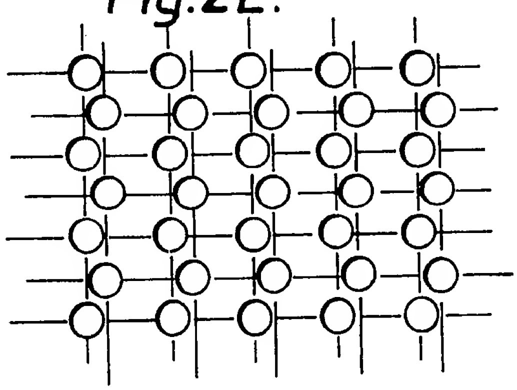
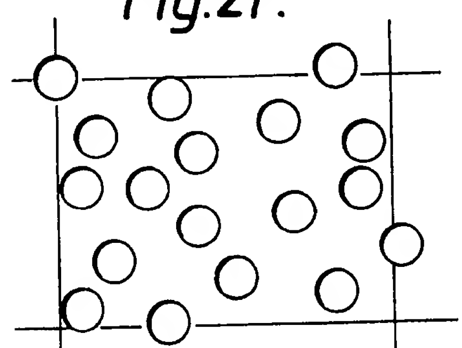


Fig.2F.



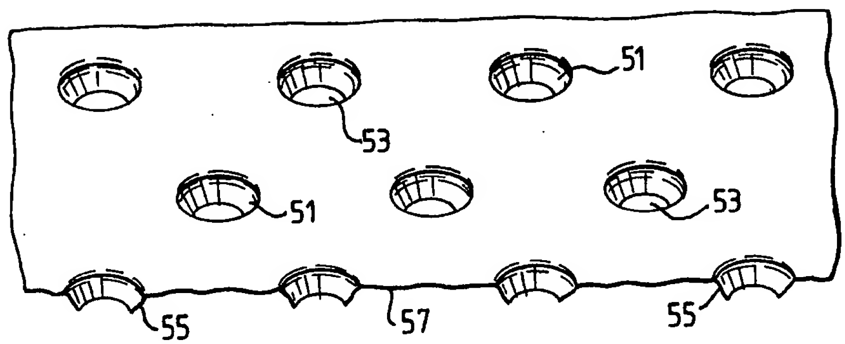


Fig.3.

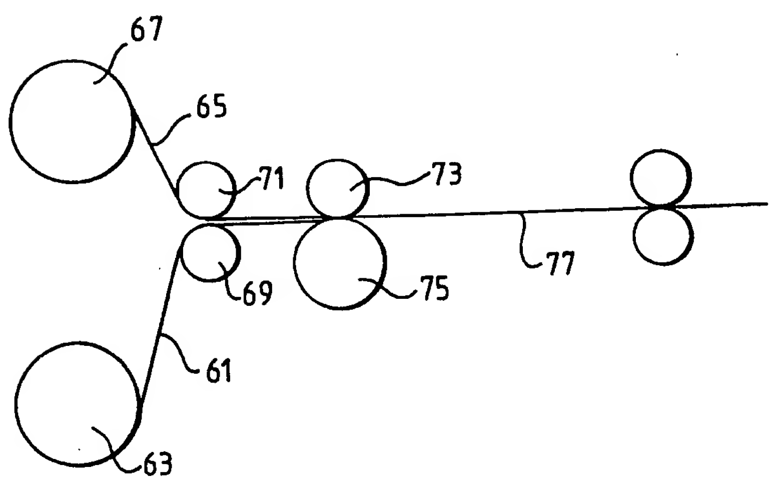


Fig.4.

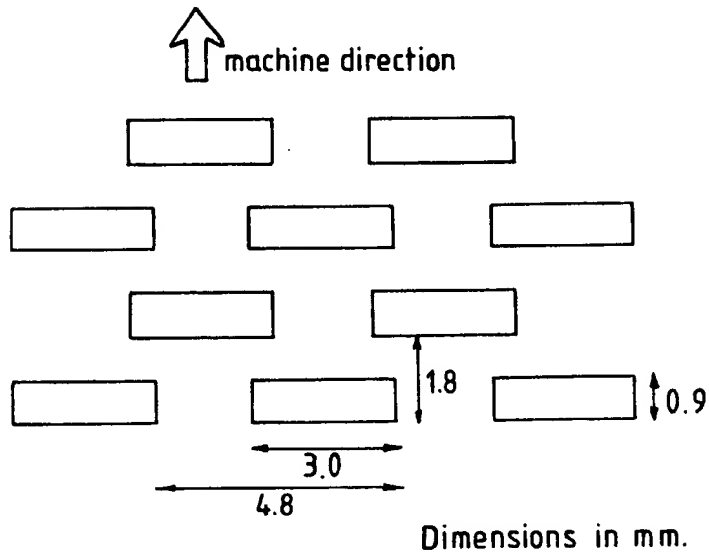

machine direction
1.8
0.9
3.0
4.8
Dimensions in mm.

Fig.5A.

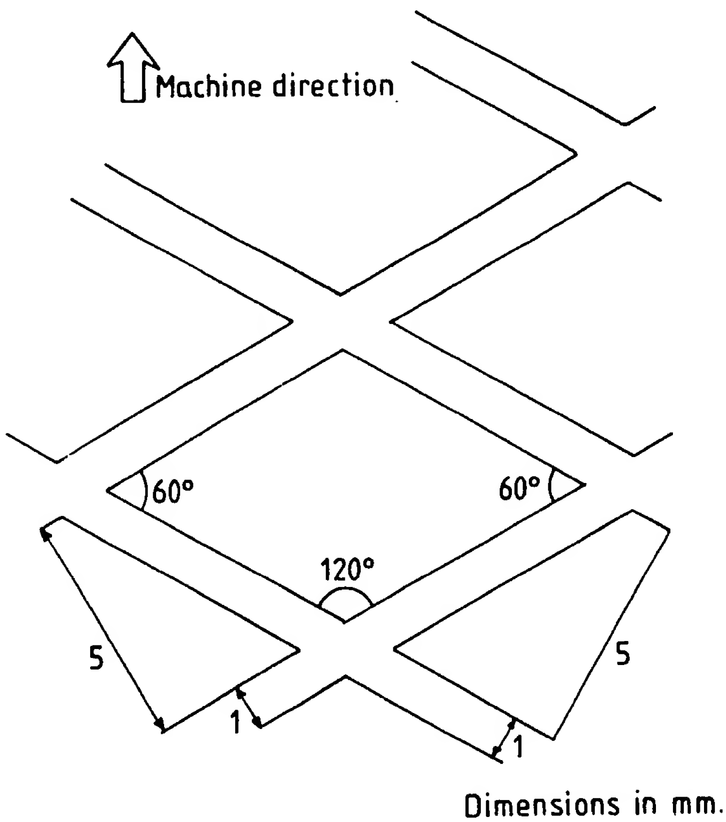

Machine direction
60°
60°
120°
5
5
1
1
Dimensions in mm.

Fig.5B

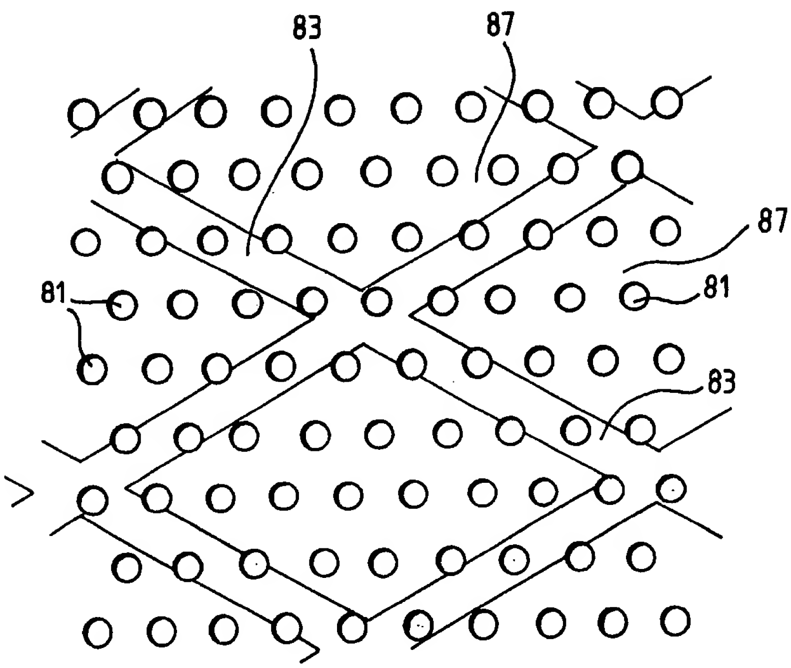


Fig.6.

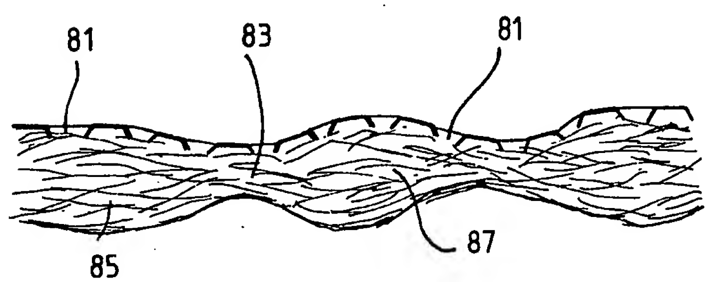


Fig.7.

SPECIFICATION

Absorbent laminates

This invention relates to absorbent laminates, and more particularly to laminates for use as the absorbent structure or absorbent facing of products which are intended to absorb body fluids. Included in such products are such articles as disposable diapers, wound dressings, bandages, sweat bands, incontinence pads and sanitary products.

An absorbent facing for a wound dressing should ideally have two properties which in practice are difficult to reconcile in a single material. These properties are high absorbency and low adherence to a wound surface. There have accordingly been numerous proposals for absorbent facings for wound dressings in which low adherence to the wound surface is provided by a wound-contacting layer, and high absorbency is provided by a layer of a different material laminated thereto. Such structures are disclosed, for example, in US–A–3,331,728, US–A–2,923,298 and US–A–3,307,545.

The perforated film/fibre laminate of US–A–3,331,728 is formed by providing a fibrous substrate, such as a woven or nonwoven fabric, which has definite pre-formed openings passing directly therethrough, and extruding onto the substrate a film of thermoplastics material such as polyethylene. Simultaneously with the extrusion process, a vacuum is applied to the surface of the substrate opposite to that to which film has been applied, sufficient to burst the film while still highly plastic, in the area immediately over the openings in the fibrous substrate. By this process, the film is drawn into intimate contact with the very edge of the perforations and ruptured or burst in the areas immediately overlying the perforations. Laminates made in accordance with the teaching of US–A–3,331,728 have been widely used and sold under the Trade Mark KEYBAK.

The laminate of US–A–2,923,298 is formed either with or without heat by sealing through activation of adhesive properties of either or both elements of the laminate or of an adhesive interposed therebetween. In general, where the wound-contacting film is such that it may be melted sufficiently for heat-sealing at a temperature below the scorch point of the absorbent backing, it is preferred to unite or bond the film and absorbent backing by pressure heat-sealing methods. The specification also indicates that it is preferred to unite the film portion of the dressings in an imperforate condition to the absorbent backing and thereafter to make the openings in the film by one of several methods, such as by punching holes from the film side by means of rolls studded with piercing pins such as the pins on a cotton card.

The laminate of US–A–3,307,545 is formed by positioning the non-adherent wound-contacting film and the absorbent backing one on top of the other to form a composite body, and then pressing hot, relatively short, blunt protuberances, such as the knees of a screen, against the film side of the composite body. The localised heating by the blunt protuberances causes melting of the film in the area contacted. At the periphery of the area contacted by the protuberances, the film becomes firmly bound to the substrate; while in the centre of the heated area, resinous material flows down into the substrate thus coating some of the underlying fibres. The pressure of the protuberance combined with the resinous material flowing into the substrate causes the fibre web to compact, thus forming a slight recess.

We have now found that an absorbent laminate having highly advantageous properties may be formed by superimposing a perforated plastics film on a fibrous web having a proportion of thermal bonding fibres therein, and embossing the two layers in a pattern which extends over at least some of the apertures in the film and over at least some of the areas of the film therebetween. This procedure results in the formation of a laminate in which the fibres of the absorbent layer are compressed in the region of at least some of the apertures in the plastics film. However, in contrast to the laminates disclosed in US–A–3,331,728 and 3,307,545, the interstices between the fibres of the absorbent layer in such compressed regions are found to be occluded to only a slight extent (if at all) by the material of the thermal bonding fibres. This has the advantage that the capillarity of the absorbent layer in such regions is greatly increased, so that liquid applied to the film side of the laminate is rapidly wicked away into the non-embossed regions of the laminate, giving reduced strike-through and reduced wet-back as compared with prior art laminates.

(Strike-through is a measure of the rate at which liquid applied to the film side of the laminate is detectable at the free surface of the absorbent layer of the laminate, while wet-back is a measure of the extent to which liquid which has been absorbed by the laminate through the film side thereof can be drawn back through the film layer by the application of pressure thereto).

According to the present invention, therefore, there is provided an absorbent laminate comprising a fibrous layer having thermal bonding fibres therein, and a perforated plastics film bonded thereto by embossing in a pattern which extends over at least some of the perforations in the film and over at least some of the regions therebetween.

In one embodiment, the plastics film and the fibrous web are laminated by bringing them

together in the nip between a pair of calender rolls, one or both of which is heated. If only one roll is heated, it is preferred that this be the one which is on the side of the fibrous web. The laminated web is then passed between cold or warm embossing rolls which are engraved with the desired emboss pattern. In an alternative embodiment, the plastics film and fibrous layer are brought together in the nip between a pair of heated embossing calender rolls, so as to laminate and emboss in one operation.

In a further embodiment, the plastics film and the fibrous web are brought together and then passed under a hot-air gun or infra-red heater or similar heating device immediately prior to being passed between unheated laminating and embossing rolls. In yet a further embodiment, the plastics film and the fibrous web are laminated by passing along a perforated belt, with reduced pressure being applied under the belt and heating being applied from above. By using a suitably formed (e.g. engraved) belt with appropriate release properties, the two layers may be caused to bond to each other with regions of differing loft being formed, similar to the regions of differing loft obtained during a true embossing operation. Reference may be made to EP–A–0106604 for a discussion of this type of process. It will be understood that, for the purposes of the appendant claims, this and analogous processes are considered to be embossing processes and the products formed thereby are considered to be embossed.

Preferably, the plastics film and the fibrous layer are brought together between a heated engraved roll and one cotton roll, with the heated engraved roll being on the fibrous web side of the laminate.

The bond between the plastics film and the fibrous web will be strongest in the embossed regions of the laminate but it is preferred that there is also some bonding between the layers in the non-embossed regions.

In view of the use of thermal bonding plastics materials in the laminates of the present invention, any rolls or belts which are used during the manufacture thereof should have good release properties, such, that the heated layers do not adhere to them. Preferably, such rolls and belts are coated with a release agent such as polytetrafluoroethylene.

Preferably, the thermal bonding fibre constitutes at least 10% by weight of the material of the web, and more preferably at least 20% by weight. In particularly preferred embodiments, the thermal bonding fibre constitutes from 50% to 100% by weight of the material of the web. It will be appreciated, however, that the percentage of thermal bonding fibre used will depend on the chemical properties of the thermal bonding fibre and on those of the perforated film, as well as on the particular laminating and embossing conditions chosen.

The thermal bonding fibre may be a melt fibre, a deformable fibre or a bi-funtional (bicomponent) fibre. Melt fibres are generally homofibres with a clear-cut melting point, such that when a mat of such fibres is exposed briefly to a temperature above melting point the fibres become fused at the points of contact between them. Examples of such fibres include polyester fibres, polyvinyl chloride fibres, polyethylene fibres and polyamide fibres.

Deformable fibres are fibres such as polypropylene and certain polyesters which are deformable under heat and pressure. The deforming temperature lies between the glass transition temperature and the melting point.

Bicomponent fibres have a component such as polyethylene which melts during the lamination process, and a higher-melting component such as polyester and polyamide which remains unaffected at the lamination temperature. Bicomponent fibres are disclosed, for example, in US–A–4,211,816, US–A–3,924,045, US–A–3,316,336, US–A–3,713,875, US–A–3,381,074, US–A–3,017,686, US–A–4,145,473, US–A–3,511,747, US–A–3,595,731, US–A–3,900,549, US–A–2,931,091, GB–A–1,149,270 and EP–A–0070163.

The fibrous web may, in addition to the thermal bonding fibres, contain absorbent fibres, such as pulp-length natural cellulose fibres (including wood pulp fibres and cotton linters), rayon staple fibres, cotton fibres and mixtures thereof. Methods of making nonwoven fabrics comprising mixtures of absorbent fibres and bicomponent fibres are described in EP–A–0070164.

In a particularly preferred embodiment of the present invention, the fibrous web comprises a three ply laminate, as described in EP–A–0070164. The core component consists of a randomly laid mixture of 50% pulp-length absorbent fibres and 50% bicomponent fibres to a total weight of approximately 85 g/m^2. The bicomponent fibre is preferably a 50:50 polyester:polyethylene composite. The veneers of the laminate consist of bicomponent fibre webs of weight approximately 17 g/m^2.

The plastics film may be of any material which can be satisfactorily bonded to the thermal bonding fibres in the fibrous web. The film may be formed, for example, from a polyolefin, a thermoplastic polyurethane, a thermoplastic polyamide or a polyester. Preferably, the polymer used will have a melting point less than 105°C. The Vicat softening point of the polymer will preferably be between 50° and 85°C, and more preferably between 60° and 80°C.

When the laminate of the invention is to be used as (or in) a wound dressing, the polymer film should preferably display low adherence to wounds. Examples of suitable polymers for this purpose are polyolefins (such as polyethylenes or polybutadienes), polymers of olefins with minor

amounts of comonomers or ionomers (i.e. metal salts of olefin/organic acid copolymers resins) and polyurethanes. Particularly suitable are copolymers of ethylene with minor amounts of methyl acrylate or vinyl acetate, such copolymers being less crystalline and softer than polyethylene homopolymers. For use in the laminates of the present invention, the copolymers preferably comprise from 10 to 30% by weight of methyl acrylate or vinyl acetate, and more preferably from 15 to 25% by weight. e.g. from 17 to 20% by weight. Specific examples of suitable polymers include POLY-ETH (Trade Mark) 2255 and POLY-ETH 2205 ethylene-methyl acrylate copolymer, ESCORENE (Trade Mark) ethylene-vinyl acetate copolymer and SURLYN (Trade Mark) 1652 ionomer. POLY-ETH 2255 and POLY-ETH 2205 ethylene-methyl acrylate copolymer are available from Gulf Oil Chemicals Company, ESCORENE ethylene-vinyl acetate copolymer is available from Esso Chemicals and SURLYN 1652 ionomer is available from Du Pont.

Generally, we have found that ethylene-methyl acrylate films give lowest adherence to wounds, with polypropylene and polyethylene films performing nearly as well.

The thickness of the polymer film is also of importance if the laminate of the invention is to be used to provide a wound-contact layer. We have found that if the film is too thick, it has increased adherence to wounds, as well as being insufficiently conformable. On the other hand, if the film is too thin, the size and shape of the perforations therein may be difficult to control, with possible adverse effects on fluid permeability and possibly wound adherence. Generally, therefore, it is preferred that the film be from 15 to 80 microns thick, and more preferably from 40 to 70 microns thick, for example 55 to 60 microns thick.

The open area of the plastics film will depend on the end use to which the laminate is to be put. If the laminate is to be used to provide a wound-contact layer, it is found that too high an open area leads to increased wound adherence, drying out of the wound surface, and the possibility of mechanical damage to the wound. Too low an open area leads to interference with the flow of exudate from wounds, the possibility of exudate pooling under the dressings, reduction in conformability, and possibly increased wound adherence. Generally, therefore, it is preferred that the open area lies between 10% and 40%, more preferably between 15 and 26%, with the optimum being about 20%. Such an open area is preferably achieved using uniformly spaced apertures between 0.5 and 5 mm apart, preferably between 1 and 3 mm apart, e.g. 1.5 mm apart. The apertures preferably have the diameter between 0.5 and 1 mm, more preferably between 0.6 and 0.8 mm, for example approximately 0.7 mm.

When the laminate of the invention is to be used in sanitary protection products, the open area should be such that the plastics layer does not act as a barrier to menstrual fluid. It should also provide a snag-free surface with a degree of cushioning. It should not lead to an excessively moist surface and should have good wet-back properties. To attain these characteristics, a larger open area is desirable. This may be achieved by increasing the hole size, by increasing the hole density, or by both means. The preferred open area for laminates which are to be used in sanitary protection products is from 20 to 80%, and more preferably from 30 to 50%.

When the laminates of the invention are to be used in incontinence aid products, the prime consideration is that the plastics film should not act as a barrier to fluid entering the fibrous layer, and it is therefore preferred to use a larger hole size in such applications rather than an increased number of holes.

The apertures in the plastics film may be formed in a variety of different patterns. For example, the pattern of apertures may be random, pseudo-random or regular. In the latter case, the apertures, may, for example, be arranged to form a plurality of square unit cells, rhomboidal unit cells or a plurality of superimposed patterns of square or rhomboidal unit cells.

The apertures in the plastics film may be created in a variety of ways. For example, the apertures may be created by means of a laser. Preferably, however, the apertures are created by placing the film on an apertured support and applying a pressure difference across the film so that the film is ruptured in the regions of the apertures in the support. Usually, the film will be softened during this process by heating. Film which is perforated in this way is characterised by the presence of raised areas around each aperture on the side of the film which was subjected to the lower pressure. This feature, which will be more particularly described below, gives rise to a number of advantages. For example, it is found to enhance fluid flow through the film from the smooth side thereof, and to give greatly improved wet-back characteristics. Also, the film is found to be highly conformable, and the smooth surface displays exceptionally low adherence to wounds.

Methods for vacuum rupturing plastics films are disclosed, for example, in US-A-3054148. This specification discloses apparatus comprising a stationary cylindrical drum supported at each end of a centrally disposed axle by means of suitable supports. The outer cylindrical surface of the drum is formed of a material having a relatively low coefficient of friction and a perforated element is mounted around the surface of the drum and is adapted to be rotated freely thereon. A vacuum chamber is positioned inside the drum along the axis thereof and opens at the surface of the drum over a limited portion of its periphery in contact with the inner surface of the perforated element. In operation of the apparatus, a thermoplastic sheet is fed onto the rotating

perforating element, rotation of which causes the sheet to pass beneath a heater where the material is plasticized and then over the vacuum chamber which causes the thermoplastic material to flow uniformly into the perforations provided in the perforated element.

Laminates according to the present invention, and a method for making same, are now described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a schematic representation of apparatus suitable for perforating a plastics film,

Figures 2A to *2F* show examples of patterns of apertures which may be produced using the apparatus of Fig. 1,

Figure 3 is a perspective view, partly in section, showing a film which has been perforated on the apparatus of Fig. 1,

Figure 4 is a schematic representation of apparatus suitable for forming the laminate of the invention,

Figures 5A and *5B* show examples of embossing patterns which may be obtained using the apparatus of Fig. 4,

Figure 6 is a plan view of a laminate according to the invention, and

Figure 7 is a schematic section, not to scale, through the laminate of Fig. 6.

Referring to Fig. 1, ethylene-methyl acrylate (EMA) film 1, 50 u thick and 180 mm wide, is drawn from a supply roll 3. Four spaced adhesive-coated tapes 5, 12 mm wide, are simultaneously drawn from a second supply roll 7.The EMA film 1 and the adhesive-coated tapes 5 are drawn into the nip between a heated roller 9 and a cold roller 11, with the adhesive coated surface of the tapes facing the EMA film. The pressure between rollers 9 and 11 secures the warm adhesive to the EMA film. The adhesive tapes serve to provide stability to the EMA film during the perforation process.

The film with adhesive tapes securely attached passes over a guide roller 13 and onto a thin perforated mild steel drum 15. The drum is coated with PTFE in order to assist in the subsequent release of the film from the surface thereof. Inside the drum is a stationary member 17 having a plurality of radially-extending vanes 19. These divide the inside of the drum into a number of sectors which are maintained at different pressures. The negative pressure in section 21 (approximately 0.5 kPa below atmospheric pressure) sucks the EMA film onto the surface of the drum and stabilises it there. Air at a temperature of from 200 to 400°C is directed at those parts of the film exposed between the tapes in the region of sector 23. The hot air softens the EMA film and the relatively high vacuum (approximately 2.5 kPa below atmospheric pressure) in section 23 ruptures the film at the perforations.

Air at ambient temperature is drawn into the centre of the drum through the newly formed perforations 25 in the EMA film by the partial vacuum (approximately 1.25 kPa below atmospheric pressure) in section 27, which constitutes the primary cooling zone. Cooling continues over the secondary cooling zone 29, but here the negative pressure is kept low (approximately 0.25 kPa below atmospheric pressure) to enable the cool film to be pulled off the cooled drum at roller 31 at a speed of 5 m/min.

The apertures in the surface of the drum 15 may be formed in any desired pattern. By way of example, Fig. 2A shows apertures in a square unit cell pattern with each aperture having four nearest neighbours, Fig. 2B shows apertures in a rhomboidal unit cell pattern with each aperture having six nearest neighbours, and Fig. 2C shows apertures in a rhomboidal cell unit pattern with each aperture having 2 nearest neighbours. Fig. 2D shows a pseudo-random pattern of apertures, Fig. 2E shows the pattern formed by superimposing two square unit cell patterns, and Fig. 2F shows a true random distribution of apertures.

As can be seen from Fig. 3, the vacuum-rupturing process yields crater-like formations 51 surrounding each aperture 53. Viewed from the other side of the film, these crater-like formations 51 appear as "funnels" 55 upstanding from the surface 57 to which the reduced pressure was applied.

A preferred embodiment of the lamination process is shown schematically in Fig. 4. Perforated EMA film 61 is drawn from a supply roll 63, while a nonwoven fabric 65, formed partly of thermal bonding fibres, is simultaneously drawn from a second supply roll 67. The EMA film and the nonwoven fabric are brought together in the nip between a pair of guide rolls 69, 71, with the nonwoven fabric facing the surface of the EMA film which has the "funnels" upstanding therefrom. The film and fabric are then fed into the nip between a heated metal calender roll 73 and a cotton roll 75, to form a laminate 77.

The surface of the calender roll is engraved so as to produce a continuous pattern of embossing on the laminate, the engraving being suitably to a depth of from 0.5 to 2 mm. A discontinuous embossing pattern in the form of a series of broken lines extending across the machine direction is shown by way of illustration in Fig. 4A, while Fig. 4B shows a continuous embossing pattern in the form of two series of parallel lines which intersect at an included angle of 60° to form a pattern of diamonds. In both cases, the embossed area constitutes 31% of the total area.

The temperature of the heated roll 73 and the pressure between rolls 73 and 75 are chosen

to cause the thermal bonding fibres in the fabric 65 to adhere to the EMA film 61.

A laminate according to the invention is illustrated in Figs. 6 and 7. As can be seen from Fig. 6, the pattern of apertures 81 in the EMA film 61 and the embossing pattern are superimposed so that the embossed regions 83 extend over some of the apertures 81 and over some areas of the film therebetween. In the embossed regions 83, the fibres of the web 85 (Fig. 7) are compacted as compared with non-embossed regions 87. This increases the capillarity of the embossed regions 83, so that a droplet of moisture entering through an aperture 81 within an embossed region 83 is rapidly wicked away to a non-embossed region 87, where the total absorbent capacity is higher.

Laminates according to the invention are further illustrated by the following examples

EXAMPLE 1

A 50 u thick film of POLY-ETH 2255 ethylene-methyl acrylate copolymer was vacuum-ruptured, to form a pattern of apertures having a diameter of 0.7 mm, spaced 1.5 mm apart, as shown in Fig. 2B.

The vacuum-ruptured film was laminated to a fibrous web made according to the method described in EP–A–0070164. The fibrous web was a 3-ply laminate of which the centre layer was a 50:50 air-laid mixture of bicomponent fibre and pulp fibre, the bicomponent fibre being a 50:50 composite of polyester and polyethylene. The veneers of the laminate were 17 g/m^2 web of 100% bicomponent fibre.

The perforated film and fibrous web were laminated by passing them between a heated engraved calender roll and a cotton roll at a speed of 11 m/min. The calender roll (type RKK510; Ramisch Kleineweefers) was 600 mm wide, 200 mm in diameter and was engraved to a depth of 1 mm in the diamond pattern of Fig. 5B. It was maintained at a temperature of 100°C, while the cotton roll was maintained at a temperature of 60°C. The calender pressure was 36N.

The wet-back, absorbency and strike-through properties of the resulting laminate were tested in the following manner:

A flat waterproof base plate was provided, onto which a pre-weighed circle of absorbent paper was placed. Over this was placed the pre-weighed test sample with the perforated film uppermost.

A total of 0.25 g of the test fluid (simulated blood) was then applied to the centre of the sample at a rate of 0.5 ml/min, and the sample was left for a further 5 minutes to equilibrate. A further pre-weighed circle of absorbent paper was then placed over the test sample and a 3 kg weight applied for 10 seconds. The weight was removed and the sample left to equilibrate for a further 5 minutes. The sample and the absorbent papers were then weighed.

By way of control, the same procedure was applied to a simple laminate formed from the same materials as the test sample, but without the embossing step.

Visual inspection of the test sample and control revealed that the test fluid spread over an area of 17.4 cm^2 with the embossed product, but over only 1.5 cm^2 with the non-embossed product. The embossed test sample retained 88% of the applied fluid, The balance being found in the lower absorbent paper as a result of strike-through. No measurable wet-back was observed. In contrast, the non-embossed product was found to retain only 60% of the test fluid, with 12% wet-back and 28% strike-through.

These results demonstrate that the embossed laminates of the present invention have properties which are highly advantageous as a result of their ability to spread applied fluid over a large area.

EXAMPLE 2

Example 1 was repeated, except that the calender roll temperature was increased to 100°C, the cotton roll temperature to 70°C, the calender pressure to 40 N, and two layers of fibrous material were used instead of one. This increased the bulk of the resulting laminate to 1.38 mm/4 ply, with a consequent increase in absorbency. In the test of Example 1, 100% of applied fluid was retained. In other words, no measurable strike-through or wet-back was observed.

EXAMPLE 3

Example 1 was repeated using a calender roll engraved to a depth of 0.6 mm in the pattern of Fig. 5A. When test fluid was applied as described in Example 1, it was found to spread over an area of 4.5 cm^2. This is somewhat less than was observed in Example 1, using a laminate having a continuous embossing pattern, but it still represents a considerable improvement over the unembossed laminate, and absorbency was still very high at 88%

EXAMPLES 4–7

Further laminates were prepared using the procedure of Example 1, and varying the process parameters as shown in Table 1. For ease of comparison, Table 1 also includes the correspond-

ing data for Examples 1–3.
In all cases, the laminates obtained displayed the highly advantageous characteristics shown by the laminates of Examples 1–3.

TABLE

EXAMPLE	1	2	3	4	5	6	7
Grammage (g/m^2)	116	187	116	187	63	186	256
Construction :							
- layers 3-ply laminate	1	2	1	2	-	2	3
- layers 100% bicomponent fibre	-	-	-	-	1	-	-
- layers EMA	1	1	1	1	1	1	1
Bulk (mm/4 ply)	0.9	1.38	0.84	0.75	0.48	1.06	1.20
Calender pressure (N)	36	40	36	40	36	40	50
Temperature cotton roll (^{O}C)	60	70	63	69	60	68	73
Temperature engr. roll (^{O}C)	100	110	100	108	99	105	110
Engraving pattern	D	D	IL	D/IL	D	IL	IL
Speed (m/min.)	11	11	11	11	11	11	11

D = Diamond IL = Intermittent line

It will be understood that the present invention has been described above purely by way of example, and many modifications are possible within the scope of the invention. For example, a two-layered laminate according to the invention may subsequently (or even simultaneously) be laminated to other layers, such as layers of conventional absorbents.

CLAIMS

1. An absorbent laminate comprising a fibrous layer having thermal bonding fibres therein, and a perforated plastics film bonded thereto by embossing in a pattern which extends over at least some of the perforations in the film and over at least some of the regions therebetween.

2. An absorbent laminate according to claim 1, wherein the plastics film is formed from a modified polyolefin.

3. An absorbent laminate according to claim 2 wherein the plastics film is formed from a methyl acrylate-modified polyethylene.

4. An absorbent laminate according to any preceding claim wherein the plastics film is perforated by vacuum-rupturing.

5. An absorbent laminate according to any preceding claim wherein the fibrous layer is a nonwoven fabric.

6. An absorbent laminate according to any preceding claim wherein the thermal bonding fibres are bicomponent fibres.

7. An article for absorbing body fluid, said article being made from or including an absorbent laminate according to any of claims 1 to 6.

8. A method of forming an absorbent laminate comprising superimposing a perforated plastics film on a fibrous web having thermal bonding fibres therein, and embossing the two layers in an embossing pattern which extends over at least some of the apertures in the film and over at least some of the areas of the film therebetween.

9. A method according to claim 8, wherein the plastics film is as recited in any of claims 2 to 4.

10. A method according to claim 8 or claim 9, wherein the fibrous layer is a nonwoven fabric

11. A method according to any of claims 8 to 10, wherein the thermal bonding fibres are bicomponent fibres.

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